FOSSIL POLYCHAETES FROM THE UPPER CRETACEOUS ROCK FORMATIONS OF SOUTH INDIA—PART II

By G. W. Chiplonkar and P. M. Tapaswi

(Maharashtra Association for the Cultivation of Science, Poona-4)

Received October 29, 1972

(Communicated by Prof. T. S. Mahabale)

Abstract

Eight polychaetan species are described here, three of which, *viz.*, *Burtinella concava* (Sow.), *Tubulostium callosum* Stol. *T. discoidium* Stol., described by Stoliczka as gastropod species, are now transferred to the Polychaeta in the light of new information. Among the three species described here as new to science, one has for its proper placement, necessitated creation of the new genus, *viz.*, *Rotulispira* falling under the subfamily Spirorbinae Chamberlin. *Spirorbula* Nielsen is repotted for the first time from South Indian Cretaceous. Family Terebellidae Grube represented by *Terebellolites* Desio, a heterogenous group, is also recorded for the first time from these deposits.

Introduction

In the present communication eight more (Chiplonkar and Tapaswi, 1973, Pt. I) polychaetan species are described. As mentioned in Part I, we have followed, except where otherwise indicated, Regenhardt (1961) in his classification of the Serpulidae.

Co-ordinates of Localities Cited in the Text

(1) Ariyalur 11° 07′ 30″ : 79° 04′ 30″,
(2) Kallankurichchi 11° 09′ : 79° 07′ 30″,
(3) Mallur 11° 04′ 30″ : 79° 05′,
(4) Mettal 11° 05′ 40″ : 79° 00′ 30″,
(5) Naicolum 11° 03′ 30″ : 78° 50′ 30″,
(6) Odiyam 11° 13′ : 78° 59′ 30″,
(7) Pondicherry 11° 56′ : 79° 50′,
(8) Saradamangalam 11° 03′ 30″ : 78° 57′,
(9) Sillakkudi 11° 04′ 30″ : 79° 00′ 30″,
(10) Uttattur 11° 04′ : 78° 51′,

ACKNOWLEDGEMENTS

Dr. G. B. Deodikar, Director, Maharashtra Association for the Cultivation of Science, has obliged us by providing the necessary facilities and by his interest in the present work. To the Director-General, Geological Survey of India we are thankful for library facilities and for access to the type specimens in their collection. Dr. M. V. A. Sastry and his colleagues in the Palaeontology Division, Geol. Surv. Ind., have been helpful to us with their comments. We are much thankful to Prof. L. Rama Rao for useful suggestions in connection with our field work. Dr. D. R. Ranade, Dept. of Zoology, University of Poona, has helped us by his useful discussion. Our colleagues Dr. V. D. Vartak, Mr. R. M. Badve and Mr. V. D. Borkar were very helpful during the field work and also otherwise. Part of this work was made possible by the financial help from the U.G.C. in the form of a Junior Research Fellowship to the Junior author.

GENERAL REMARKS

Of the nineteen polychaetan species described by us here and in Pt. I only four are found to occur attached to shells of other organisms; and for the guidance of workers interested in ecological associations of these forms it may be mentioned here that our material representing *Glomerula gordialis* (Schl.) was found attached to the test of *Epiaster nobilis* Stol., *Plcatula* (*Plicatula*) *multicostata* Forbes and *Ostrea* (*Alectryonia*) *cupelloides* Stol., and also in association with *Omasaria variabilis* Sp. nov. on shell of a *Nautilus*. The material belonging to the remaining fifteen species, as also one specimen of *Glomerula gordialis* (Schl.), was collected from the rock matrix of the different groups.

To the extent that observations go, recent polychaetes are most abundant down upto 40 m, a very large number coming within the low and high tide levels. They should therefore be useful for study of environment over the part of continental shelf where they occur. But it is at the same time remembered that polychaetes being a very adaptable group of organisms, different species even under the same genus are known to have taken to different depths and surroundings.

In our present collection *Ditrupa* is the only genus which extends from the Cretaceous into the Recent times, the remaining twelve genera being known only in fossil record, mainly of the Cretaceous period. Even so from what little information is available (Regenhardt, 1961) about some

of the genera represented here, it may be useful to mention the conditions under which they occur, with a view to help they may render to future workers.

Thus *Glomerula* having a preference towards sandy or green sand facies of transgressive regions, but also occurring in current disturbed waters and sporadically in calcareous facies in shallow waters, is represented in our collection by *Glomerula gordialis* (Schl.) from calcareous grit of Ariyalur group near Kallankurchchi and from the sandy limestone of the same group near Mallur. *Sarcinella* considered to like shallow waters is represented here by two species both of which come from calcareous grit of Ariyalur group from near Mettal and Kallankurchchi. The genus *Parsimonia* with a preference for still waters has its species *P. ootatoorensis* (Stol.), in the earthy limestone of Uttattur group near Odiyam. *Omasaria* a shallow water genus, but also occurring in clay facies, is collected by us as *O. simplex* sp. nov. in the earthy limestone of Uttattur group near Odiyam and as *O. variabilis* sp. nov. in yellowish limestone of Trichinopoly group near Saradamangalam. *Proliserpula* with a bias towards well aired and agitated shallow waters is represented in our collection by *P. ampullacea* (Sow.) in the earthy limestone of Uttattur group near Odiyam. The genus *Ditrupa* occurring over so wide a range of depth as from 40 m to 1500 m on sandy, or muddy ground has its present South Indian representative *D. rugosa* sp. nov. in earthy Limestone of Uttattur group near Odiyam and *D. brevituba* sp. nov. in the brownish limestone of Trichinopoly group near Saradamangalam.

Lacinituba mallurensis sp. nov. is found attached to a shell of *Nautilus* from sandy limestone of Ariyalur group near Mallur; *Fissurituba cretacea* sp. nov., a ditrupid, and *Rotulispira stoliczkai* sp. nov., are also collected from the same sandy limestone of Ariyalur group near Mallur. As these three species belong to new genera nothing of their preference is known at present and hence only their occurrences are recorded here as above.

About *Terebellolites* sp. indet. from earthy limestone of Uttattur group near Odiyam it is of little use to say anything, it being admittedly a heterogenous group of specimens of uncertain position.

As pointed out earlier in the Introduction, fossil polychaetes are still of little help in determining the age of rock formations. Also the present fauna has majority of the species new, three of them belonging to new genera. They have thus little bearing on the age of this fauna. Even then it may be of interest to mention that we have among them some species

recorded also from outside the South Indian basin. Thus *Glomerula gordialis* (Schl.) is a widely occurring species being recorded in the Chalk of Norfolk and Sussex; Turonian of Madagascar; Lower Quader of Sachsen; Upper Cretaceous of Gehrden, Rugen (Germany) and U.S.S.R. *Sarcinella sarcinella* Reg. is reported from Coniacian rocks of Ribochere (France). *Parasimonia ootatoorensis* (Stol.) occurs in the Upper Albian of Zululand, Cenomanian of Madagascar and Lower Quader of Sachsen. *Proliserpula ampullacea* (Sow.) comes from Upper Cretaceous of Denmark, Lower Quader of Sachsen and Upper Chalk of Norfolk and Norwitch. *Sarcinella filiformis* (Sow.) is reported to occur in the Aptian of St. Croix. *Rotularia callosa* (Stol.) is recorded from the *Trigonia* sandstone of the Cretaceous of Hokkaido (Japan); *Rotularia discoidea* (Stol.) is found occurring in New Zealand in the Maestrichtian strata; while, *Burtinella concava* (Sow.) occurs in England in the Upper Cretaceous of Blackdown and in the Gault at Beer Head. The predominant evidence thus gives an age ranging over the greater part of Upper Cretaceous.

Description of Species

Subfamily: Spirorbinae Chamberlin

Tribe : Spirorbes Regenhardt, 1961

Genus : *Spirorbula* Nielsen, 1931

***Spirorbula crispans* sp. nov.** (Pl. XI, Figs. 3 and 13)

Material.—One specimen; *Holotype* No. Ma 633/70.

Description.—Tube is calcareous, spirally enrolled in an inversely conical manner. The outer surface has fine somewhat irregularly spaced, transverse rugosities representing the growth stages of the tube; wrinkled portion of the tube gives the appearance of a band fitting closely round earlier coils. The diameter of the tube grows gradually and is 5 mm at the aperture.

Remarks.—The present species agrees with *Spirorbula aspera* (Hagenow) a Senonian form from Germany (Hagenow, 1840, p. 666) in structure and form, but considering the number of coils approximately at similar stages of growth in these two species, the tube in our species is much wider being nearly 3 times that of the German species.

Regenhardt (1961, p. 87) has placed *Spirorbula* Nielsen, 1931; under the synonymy of *Spirorbis* Daudin, 1800. As we are not clear about the correctness of it, we follow Howell (1962, p. W160) in recognising *Spirorbula* as a distinct genus.

Occurrence.—Sandy Limestone from Ariyalur group at about 1 km. south of Mallur.

Tribe : Rotulariae Regenhardt, 1961

Genus : *Rotularia* Defrance, 1827

Subgenus : *Tectorotularia* Regenhardt, 1961

***Rotularia (Tectorotularia) callosa* (Stol.) 1868** (Pl. XI, Fig. 9)

Tubulostium callosum Stoliczka: Stoliczka, 1868, Pl. 241, Pl. 18, Figs. 26–32.

Material : Six specimens; Ma 649/70, Ma 648/70, Nk 60/70, etc.

Description.—Tube is calcareous, 6-7 mm in outer diameter, 2·5 to 3 mm in inner diameter and coiled in trochoid manner with left hand and right hand types. Surface of the tube is wrinkled with intermittant narrow gaps in wrinkling, and appears to form a band tightly coiled along the suture on the upper surface and along the umbilicus on the under surface. The tube has three prominent keels at the periphery; they are seen on the last coil, those on the earlier coils being concealed by later whorls. The inner and outer diameter of the tube are uniform over most of its length. At the last stage of growth, however, some thickening of the tube takes place externally and after that, the tube narrows appreciably externally and also to a slight extent internally. The tube gets detached almost tangentially to the coil at this place.

Remarks.—Stoliczka (1868, p. 240) had described *Tubulostium* Stoliczka as a gastropodous genus; but now it is transferred to the Polychaeta and placed as a synonym of *Rotularia* Defrance, 1827 (Howell, 1962, p. W159).

Some of the specimens in our collection are lower than others in their conical appearance.

The tube appears to bear several minute holes perhaps borings by some organisms, may be fungal or other type. Stoliczka has described the above species (1868, p. 241) from lower clay beds of the Uttattur group from north of Uttattur and in the neighbourhood of Karai and mentions it as characteristic of the Uttattur group. But we have found it also in sandy limestone from Ariyalur group near Mallur.

As compared with *Tubulostium nysti* Gal. (Roverto, 1904, pp. 74–75, Pl. 3, Fig. 7) an Eocene form, our specimens are much larger, more conical and have much narrower umbilicus.

Occurrence.—Sandy limestone from Ariyalur group at about a km south of Mallur and in earthy limestone from Uttattur group at about a km east of Naicolum.

***Rotularia (Tectorotuldaia) discoidea* (Stol.) 1868.** (Pl. XI, Fig. 15)

Tubulostium discoidium Stol.; Stoliczka, p. 240, Pl. 18, Figs. 20–25.

Material.—Large number of specimens, Od 224/70, Od 228/70.

Description.—Tube is wound, more discoidally than helicoidally, both in right-handed and left-handed manner, a few specimens being discoid and thus transitional. The first whorl is loosely coiled so as to leave a small circular gap in the centre. The outer diameter varies from one mm to two mm. Internally the cross-section is circular or almost so. The inner and outer diameters of the tube are essentially constant showing a very slight increase towards the apertural end. External surface carries four keels, the distance between the two peripheral keels being slightly less than that between them and those on either of the sides. The surface is concave between every two of the keels, and is mostly smooth, wrinkles being distinctly visible on the keels, particularly along the inner margin of each coil. The apertural portion of the tube approximately 2 mm long is detached and drawn out tangentially to the coil. At the place of detachment the tube is thickened externally, becoming more or less circular with disapparance of all the keels. The diameter of the disc varies between 7 mm and 11 mm.

Remarks.—In their mode of coiling and 4 keels on their outer surface *Tubulostium bognoriense* (Sow.) (Roverto, 1904, p. 74, Pl. 3, Fig. 13) and *T. angulosum* (Chennu) (Roverto, 1904, Pl.3, Fig. 14) both from the Eocene of Italy resemble the present species but differ from it in their dimensions.

Vermetus tumidus Sow. from Coral Rag (Upper Oxfordian) of Scarborough (Sowerby, 1837, p. 195, Pl. 596, Fig. 4) is much like the present species but has different dimensions. Stoliczka compared his *Tubulostium discoidium* with it probably to imply that it is also a species of *Tubulostium*. According to Howell (1962, p. W159) *Tubulostium* is a synonym of *Rotularia* Defrance, 1827, which ranges from Upper Cretaceous to Eocene. Therefore, if *Vermetus tumidus* Sow. is found to be a *Rotularia*, it would mean that *Rotularia* has to range down into Upper Oxfordian.

Occurrence.—Brownish limestone from Trichinopoly group at about a km north-west of Saradamangalam; and earthy limestone from Uttattur group at about 2 km north-east of Odiyam.

***Rotularia (Tectorotularia) rotuloidea* sp. nov.** (Pl. XI, Figs. 4, 5 and 14)

Material.—Large number of specimens, *Holotype* No. Sd. 424/70, Co-type No. Od 225/70.

Description.—The tube is coiled, only slightly departing from planospiral mode; internally cross-section is circular or nearly so; externally it carries five keels giving it a five-sided cross-section. The surface between every two of the keels is feebly convex, but that in contact with the earlier coil, is concave. At the last stage of coiling the tube appears to twist slightly about its longitudinal axis, so that the peripheral upper feeble keel gets deflected outwards giving to the tube an apparent quadrate cross-section; but a careful study shows that the tube still has a five-sided cross-section, though a little irregular. At this stage the tube gets drawn out straight tangentially to the coil and thus the portion is detached from the coil. The tube, externally as well as internally, shows only a slight increase in diameter over most of its length. But at the point of detachment of the apertural portion the tube gets thickened externally and after that the diameter is appreciably reduced internally and externally along with disappearance of the keels. Externally the tube has well developed growth wrinkles which are more accentuated on the ridge along the inner margin of the coil. Left-handed coiling is more common than right-handed, and a few specimens have essentially a symmetrical discoid appearance. The diameter of the total disc (coil) is 10 to 12 mm and the external diameter of the tube at the aperture is upto 2 mm.

Remarks.—By its five keels giving it a five-sided cross-section the present species can be easily distinguished from *R.* (*T.*) *discoidea* (Stol.) with which it is associated.

As compared to *R. spirulaea* (Lamarck) from the Eocene of France (Howell, 1962, p. W159, Fig. 19·4), our species is hardly half the size of the French species and also has a much smaller diameter.

R. (*T.*) *quinquecarinata* (Roemer) from Hauterivian of Harzvorland (Regenhardt, 1961, p. 94, Pl. 8, Figs. 10 and 11) is bigger than our species and has a six-sided cross-section (Fig. 11).

Occurrence.—Earthy limestone from Uttattur group at about 2 km north-east of Odiyam; and brownish limestone from Trichinopoly group at about 1 km north-west of Saradamangalam.

Rotularia* (*Tectorotularia*) sp. *indet. (Pl. XI, Figs. 10 and 11)

Material.—A single specimen; Od 221/70.

Description.—Tube is rather tightly coiled in a (?) left-handed plano-spiral manner. Even in its much weathered condition the specimen shows transverse wrinkles with a slight but smooth backward deflection along the periphery of the coil and tending to verix-like prominance at two or perhaps three places. The diameter of the tube goes on increasing gradually; at the apertural end the inner diameter is 3 mm the external diameter being a little more than 5 mm. The diameter of the whole disc is 15 mm. Near the apertural end where the lower surface of the tube is exposed, externally it appears to be nearly flat to very feebly convex and is more rounded on other sides. Internally the tube is almost circular, its inner margin being not as much curved as the rest of the surface.

Remarks.—As compared with R. (T.) *rotula* (Goldf.) from Cenomanian-Turonian of Regensburg, Bayer (Germany) (Regenhardt, 1961, p. 94, Pl. 8, Fig. 12) our specimen mostly agrees with it but due to poor state of preservation we hesitate to place it under that species.

Occurrence.—Earthy limestone from Uttattur group at about 2 km north-east of Odiyam.

Genus : *Rotulispira* gen. nov.

Type : *Rotulispira stoliczkai* sp. nov.

Diagnosis.—Calcareous, tube, spirally coiled, left- or right-handed apically attached, transversely wrinkled, apertural portion detached without constriction and external thickening.

Remarks.—This genus differs from *Rotularia* Defrance, 1827 in having detachment of the apertural portion without thickening by calcareous deposition and without constriction of the tube; also the detached portion of the tube is very much longer than what is found in *Rotularia.* It differs from *Conorca* Regenhardt, 1961, (Regenhardt, 1961, p. 95) by its low spiral coiling with apertural long detached portion and a much wider tube.

By its detached apertural portion of the tube this genus differs from *Spirorbis* Daudin, 1800 and *Spirorbula* Nielsen, 1931 (Howell, 1962, p. W160) with which it is likely to be confused in specimens with their detached portion lost in the event of damage.

Rotuilspira stoliczkai **sp. nov.** (Pl. XI, Figs. 2 and 12)

Material.—Single specimen; *Holotype* No. Ma 650/70.

Description.—The tube is calcareous, circular in cross-section and spirally coiled in a right-handed manner. After completing three (or perhaps four) coils the tube gets detached almost tangentially from the coil and is very slightly curved to a length of approximately 10 mm, length of the detached portion being thus nearly equal to that of the last coil. On the outer surface it has fine transverse wrinkles which tend to be oblique backwards along the contact with the coiled portion, where they tend to form a thin band fitting tight along the suture. As compared to the coiled portion of the tube, wrinkles are more conspicuous on the detached portion. Outer diameter of the tube at the apertural end is 4 mm, thickness of the tube wall being 1 mm.

Occurrence.—Sandy limestone from Ariyalur group at about 1 km south of Mallur.

Genus : *Burtinella* Mφrch, 1861

Burtinelia concava **(Sow.)**, 1822 (Pl. XI, Figs. 1 and 6)

Vermicularia concava Sow.: Sowerby, 1822, p. 125, Pl. 57, Figs. 1–5.

Burtinella concava (Sow.) Stoliczka, 1868, p. 242, Pl. 18, Figs. 11–19.

Material.—Two specimens; Ma 647/70 and Ma 648/70.

Description.—Features like inversely coiled tube, with circular cross-section, apertural portion detached from the coil with no external thickening nor reduction in diameter and a wrinkled band-like portion of the tube along the spiral suture and along the umbilical margin help in placing these specimens under the present species.

Remarks.—The genus *Burtinella* Mφrch, 1861 was treated by Stoliczka (1868, p. 242) under the Gastropoda along with his *Tubulosteum*, while other workers, *e.g.*, Wanner (1902, p. 129), Roverto (1904, p. 72) and Weaver (1931, p. 166) have taken it as a genus of worms. Prof. B. F. Howell, author of the Chapter on Worms in the *Treatise on Invertebrate Paleontloogy, Part W*, says in a personal communication (dated April 22, 1971) that it is possibly a genus of worms rather than of gastropods and should have been included there. But having had no occasion to see any example of it, he does not feel it safe enough to give any definite opinion on its systematic position. We choose to treat it as a worm genus as done by Wanner, Roverto and Weaver.

Though we place our specimen under Stoliczka's *B. concava* it may be mentioned that it resembles very closely *B. solarioides* Wanner from the Upper Cretaceous of Libya (Wanner, 1902, p. 129, Pl. 18, Fig. 21) which, however, has a more conical shape; while, *B. phillipsii* (Roemer) from Neocomian of Speeton and Central Mendosa, Argentina (Weaver, 1931, p. 166, Pl. 11, Fig. 14) and *Serpula* cf. *phillipsii* Roemer (Weerth, 1884, p. 67) are still more conical. The above two latter species as figured have their wrinkles more prominent than in our specimens evidently due to weathering. Therefore, subordinating the relative prominance of wrinkles to the general aspect of coiling of the tube, *B. concava* (Sow.), *B. solarioides* Wanner and *B. phillipsii* (Roemer) appear to differ only in respect of degree of conical coiling, so that these three forms may be found assignable to a single species. This point, however, would need material more extensive than available now, and hence for the present we treat them as three different species.

As compared with *B. zitteli* Roverto, from the Lutetion of Luteziano (Rovertto, 1904, p. 72, Pl. 3, Fig. 10), our specimens are approximately twice as big and contain more than one coil (usually 3).

Occurrence.—Sandy limestone from Ariyalur group at about 1 km south of Mallur.

Family : Terebellidae Grube, 1850

Genus : *Terebellolites* Desio, 1940

Terebellolites* sp. *indet (Pl. XI, Figs. 7 and 8).

Material.—Large number of specimens; Od 222/70, Od 223/70, etc.

Dimensions.—Outer diameter of the tube—2 mm to 9 mm. Thickness of the tube wall—0·5 mm to 2 mm.

Description.—These tubes or tube fillings are short, straight or gently bent, sometimes, bifurcating and composed of ferrugenous or calcareous sand particles. They show cross-section from circular to elliptical.

Remarks.—Some of the specimens in our collection show close resemblance to *T. fezzanensis* Desio from Devonian of Libya (Howell, 1962, p. W162, Figs. 102, 3).

Some of these specimens appear to be tubes open at both ends, filled with iron oxide and/or/calcareous grains and the surface giving an appearance of limonitic covering, though no distinct feature as a tube-wall can be

seen. Some of the specimens look almost all solid rods composed of particles of iron oxide, and appear to all practical purposes tube fillings. That the bigger of the cylinders may be infillings of burrows of boring animals like molluscs cannot be altogether ruled out.

These tubes and tube-fillings with branching or non-branching habit and falling probably in two or more groups but having almost no other discriminating features, are thus placed here together in a heterogenous assemblage of uncertain systematic position.

Occurrence.—Earthy limestone from Uttattur group at about 2 km north-east of Odiyam.

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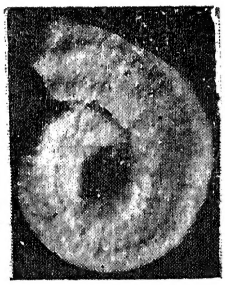
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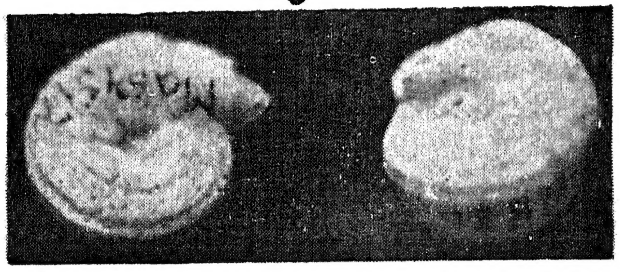
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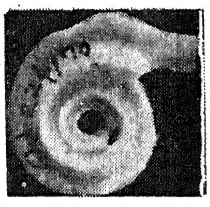
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FIGS. 1–15

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Explanation of Plate XI

Figs. 1–15

Figs. 1 and 6. *Burtinella concava* (Sow.), × 2.

Figs. 2 and 12. *Rotulispira stoliczkai* sp. nov., × 2.

Figs. 3 and 13. *Spirorbula crispans* sp. nov., × 2.

Figs. 4, 5 and 14. *Rotularia* (*Tectorotularia*) *rotuloida* sp. nov., × 10/3.

Figs. 7 and 8. *Terebellolites* sp. *indet.*, × 2.

Fig. 9. *Rotularia* (*Tectorotularia*) *callasa* (Stol.), × 2.

Figs. 10 and 11. *Rotularia* (*Tectorotularia*) sp. *indet.*, × 2.

Fig. 15. *Rotularia* (*Tectorotularia*) *discoidea* (Stol.), × 2.